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V. H. F. PRIMER

PART 6. WAVE GUIDE TABLES

By the Engineering Department, Aerovox Corporation

Accompanying this paper are two tables of wave guide data; one a chart showing cut-off wavelengths and corresponding frequencies for common sizes of square wave guides, and the other a chart giving similar data for common sizes of circular wave guides. The Editors believe that square and circular pipes will be the types most commonly employed by amateurs and experimenters, and have set up the tables for these two cross sections only. The prospective user of wave guides may consult these tables to save himself the labor of calculation when seeking cut-off values for common pipe dimensions.

In the first column of each table, common standard pipe sizes are listed every one-sixteenth of an inch apart from ⅛ inch (diameter of circular type or per-side measurement of square type) to 2 inches. These sizes will be entirely useful in the majority of cases.

The wavelength and frequency values given in each table are those corresponding to the three simplest modes, which very likely will be the principal ones in which amateurs and experimenters will be interested. These are $TE_{0\ 1}$; $TE_{1\ 1}$; and $TM_{1\ 1}$, for square wave guides and $TE_{0\ 2}$; $TE_{1\ 1}$; and $TM_{0\ 1}$ for circular wave guides. The frequencies listed in several instances exceed the present 30,000-Mc. limit of allocated super-high-frequency spectrum. However, the Editors feel that this particular data will be useful in appraising available pipes and tubes of very small cross section.

All dimensions are in inches, wavelengths in centimeters, and frequencies in megacycles per second. If it is desired to determine the size of pipe required for a cut-off wavelength not listed in the tables, one of the following equations, corresponding to the cross section and mode concerned, may be employed.

A. SQUARE WAVE GUIDES

(1) $TE_{0\ 1}$ $a=\lambda/5.08$
(2) $TE_{1\ 1}$ $a=\lambda/3.592$
(3) $TE_{1\ 1}$ $a=\lambda/3.592$

B. CIRCULAR WAVE GUIDES

(4) $TE_{0\ 2}$ $d=\lambda/2.083$
(5) $TE_{1\ 1}$ $d=\lambda/4.394$
(6) $TM_{0\ 1}$ $d=\lambda/3.327$

In each equation:

λ=cut-off wavelength in centimeters.
a=one side of square in inches
d=diameter of circle in inches
(a and d are inside dimensions)

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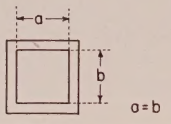
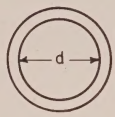
TABLE 1. Square Types



INSIDE DIMENSIONS (inches)	CUT-OFF WAVELENGTH (cms.)			CUT-OFF FREQUENCY (Mc.)		
	$TE_{0,1}$	$TE_{1,1}$	$TM_{1,1}$	$TE_{0,1}$	$TE_{1,1}$	$TM_{1,1}$
1/8 X 1/8	0.635	0.449	0.449	47,244.1	56,815.1	56,815.1
3/16 X 3/16	0.953	0.674	0.674	31,479.5	44,543.4	44,543.4
1/4 X 1/4	1.270	0.898	0.898	23,622	33,407.6	33,407.6
5/16 X 5/16	1.588	1.123	1.123	18,887.7	26,726	26,726
3/8 X 3/8	1.905	1.348	1.348	15,748	22,271.7	22,271.7
7/16 X 7/16	2.223	1.572	1.572	13,491.2	19,090	19,090
1/2 X 1/2	2.540	1.796	1.796	11,811	16,703.8	16,703.8
9/16 X 9/16	2.856	2.021	2.021	10,493.2	14,958.9	14,958.9
5/8 X 5/8	3.175	2.245	2.245	9448.8	13,363	13,363
11/16 X 11/16	3.493	2.470	2.470	8585.3	12,139.1	12,139.1
3/4 X 3/4	3.810	2.694	2.694	7874	11,135.8	11,135.8
13/16 X 13/16	4.128	2.919	2.919	7264.5	10,279.2	10,279.2
7/8 X 7/8	4.445	3.143	3.143	6749.2	9545	9545
15/16 X 15/16	4.763	3.368	3.368	6295.9	8908.7	8908.7
1 x 1	5.080	3.592	3.592	5905.5	8351.8	8351.8
1 1/16 x 1 1/16	5.398	3.817	3.817	5555.2	7860.6	7860.6
1 1/8 x 1 1/8	5.715	4.041	4.041	5249.3	7423.9	7423.9
1 3/16 x 1 3/16	6.033	4.266	4.266	4970.4	7033.1	7033.1
1 1/4 x 1 1/4	6.350	4.490	4.490	4724.1	6681.5	6681.5
1 5/16 x 1 5/16	6.670	4.715	4.715	4497.1	6363.6	6363.6
1 3/8 x 1 3/8	6.985	4.939	4.939	4294.9	6074.1	6074.1
1 7/16 x 1 7/16	7.303	5.164	5.164	4106	5810	5810
1 1/2 x 1 1/2	7.620	5.388	5.388	3937	5567.9	5567.9
1 9/16 x 1 9/16	7.938	5.613	5.613	3777.5	5345.2	5345.2
1 5/8 x 1 5/8	8.255	5.837	5.837	3634.2	5139.6	5139.6
1 11/16 x 1 11/16	8.573	6.062	6.062	3497.7	4949.3	4949.3
1 3/4 x 1 3/4	8.890	6.286	6.286	3374.6	4772.5	4772.5
1 13/16 x 1 13/16	9.208	6.511	6.511	3256.5	4607.9	4607.9
1 7/8 x 1 7/8	9.525	6.735	6.735	3149.6	4454.3	4454.3
1 15/16 x 1 15/16	9.843	6.960	6.960	3046.4	4310.6	4310.6
2 x 2	10.160	7.184	7.184	2952.8	4175.9	4175.9

TABLE 2. Circular Types



INSIDE DIAMETER (inches)	CUT-OFF WAVELENGTH (cms.)			CUT-OFF FREQUENCY (Mc.)		
	$TE_{0,2}$	$TE_{1,1}$	$TM_{0,1}$	$TE_{0,2}$	$TE_{1,1}$	$TM_{0,1}$
1/8	0.260	0.549	0.416	115,300	54,650	72,250
3/16	0.390	0.824	0.624	76,900	36,400	48,100
1/4	0.521	1.098	0.832	57,700	25,739	36,300
5/16	0.651	1.373	1.040	46,250	21,850	28,850
3/8	0.710	1.648	1.248	42,300	18,210	24,250
7/16	0.911	1.925	1.456	32,950	15,590	20,640
1/2	1.041	2.197	1.664	28,800	13,660	18,000
9/16	1.172	2.472	1.872	25,600	12,120	16,030
5/8	1.302	2.746	2.080	25,100	10,900	14,420
11/16	1.432	3.021	2.287	20,950	9940	13,100
3/4	1.562	3.296	2.496	19,200	9110	12,020
13/16	1.692	3.570	2.703	17,750	8410	11,100
7/8	1.823	3.845	2.991	16,460	7810	10,025
15/16	1.953	4.119	3.119	15,380	7280	9640
1	2.083	4.394	3.327	14,390	6835	9010
1 1/16	2.213	4.669	3.535	13,550	6438	8485
1 1/8	2.343	4.944	3.743	12,790	6075	8010
1 3/16	2.473	5.218	3.951	12,130	5760	7595
1 1/4	2.603	5.493	4.159	11,530	5469	7230
1 5/16	2.734	5.767	4.367	10,950	5200	6875
1 3/8	2.864	6.042	4.575	10,480	4971	6565
1 7/16	2.994	6.327	4.783	10,010	4740	6270
1 1/2	3.124	6.591	4.991	9610	4550	6017
1 9/16	3.254	6.866	5.199	9230	4370	5775
1 5/8	3.384	7.141	5.407	8860	4200	5450
1 11/16	3.514	7.415	5.615	8540	4045	5349
1 3/4	3.645	7.690	5.823	8235	3900	5150
1 13/16	3.775	7.965	6 031	7945	3765	4975
1 7/8	3.905	8.239	6.239	7690	3640	4810
1 15/16	4.035	8.514	6.447	7475	3525	4660
2	4.165	8.788	6.655	7225	3439	4505

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